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**IS 13161 (Part 2) : 1992**

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भारतीय मानक

# पोत निर्माण — समुद्री जहाजों पर शोर स्तर

## भाग 2 मापन संहिता

*Indian Standard*

# SHIPBUILDING — NOISE LEVELS ONBOARD SHIPS

## PART 2 CODE OF MEASUREMENT

UDC 629·12 : 534·61 : 006·76

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*January* 1992 **Price Group 2**

Shipbuilding Sectional Committee, TED 17

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Shipbuilding Sectional Committee had been approved by the Transport Engineering Division Council ( TEDC ).

This Indian Standard is a part of the series of standards on noise levels onboard ships. The other parts are:

| | |
|---|---|
| Part 1 | Glossary of terms |
| Part 3 | Maximum noise levels — Code of practice |
| Part 4 | Noise exposure limits |
| Part 5 | Requirement for protection |
| Part 6 | Guidelines for controlling noise exposure |

The purpose of this standard is to specify noise levels and to device means to reduce exposure to noise in order to:

a) Provide for safe working conditions by giving consideration to the need for speech communication and for hearing audible alarms, and to an environment where clear-headed decisions can be made in control stations, navigation and radio spaces and manned machinery spaces;

b) Protect the seafarer from excessive noise levels which may give rise to a noise-inducted hearing loss; and

c) Provide the seafarer with an acceptable degree of comfort in rest, recreation and other spaces and also to provide conditions for recuperation from the effects of exposure to high noise levels.

This standard is intended as a guide and it may not be possible to implement all or any of the measures recommended on all ships. Therefore, it also does not cover detailed technical information needed for putting constructional noise control measure into effect, or for deciding measures appropriate in particular circumstances.

In the preparation of this standard, assistance has been derived from Publication No. 814 82·05E "Noise levels onboard ships", issued by International Maritime Organization ( IMO ).

*Indian Standard*

# SHIPBUILDING — NOISE LEVELS ONBOARD SHIPS

## PART 2 CODE OF MEASUREMENT

### 1 SCOPE

This standard ( Part 2 ) specifies operating conditions, measurement procedure and positions for noise levels in various spaces onboard ships.

### 2 REFERENCE

The IS 13161 ( Part 3 ) : 1992 'Shipbuilding — Noise levels onboard ships : Part 3 Maximum noise levels — Code of practice', is necessary adjunct to this standard.

### 3 OPERATING CONDITIONS

#### 3.1 At Sea

**3.1.1** Measurements shall be taken with the ship in loaded or ballast conditions.

**3.1.2** The main propulsion machinery shall be run at normal design service shaft speed. Controllable pitch and Voith-Schneider propellers, if any, should be in the normal seagoing position.

**3.1.3** All auxiliary machinery, navigation instruments, radio and radar sets, etc, normally or likely to be, in use at any one time should operate throughout the measurement period.

**3.1.4** Measurements in spaces containing emergency diesel engine-driven generators, fire pumps or other emergency equipment that would normally be run only in emergency, or for test purposes, shall be taken with the equipment operating. Adjoining spaces need not be measured with such equipment operating, however, unless it is likely that the equipment will be operated for periods other than those mentioned above.

**3.1.5** Mechanical ventilation and air-conditioning equipment shall be in normal operation, taking into account that the capacity shall be in accordance with the design conditions.

**3.1.6** Doors and windows shall in general be closed but they shall be open in spaces where this is the normal condition, for instance in the navigating bridge where the door on the lee side is normally open.

**3.1.7** Spaces shall be furnished with all necessary equipment. Measurements without soft furnishing may be made but no allowances shall be made for their absence.

**3.1.8** Ships fitted with bow thrusters, stabilizers, etc, may be subjected to high noise levels when in operation. Measurements shall be taken at positions around such machinery when in operation and in adjacent accommodation spaces and duty stations.

#### 3.2 In Port

**3.2.1** Measurements as specified in **3.2.2**, **3.2.3** and **3.2.4** shall be taken with the ship in port condition.

**3.2.2** Measurements shall be taken with the ship's cargo handling equipment in operation, in those areas and accommodation spaces affected by its operation. Noise originating from sources external to the ship shall be discounted as indicated in **3.3.3**.

**3.2.3** Where the ship is a vehicle carrier and noise during loading and discharging originates from vehicles, the noise level in the cargo spaces and the duration of the exposure shall be measured.

**3.2.4** It will be necessary to take measurements in machinery spaces with the auxiliary machinery operating in the port condition if the provisions in respect of ear protection are to be met in lieu of the noise level in machinery spaces ( continuously manned ) during maintenance, overhaul or similar port conditions.

#### 3.3 Environmental Conditions

**3.3.1** The depth of water under the ship's keel and the presence of large reflecting surfaces in the ship's vicinity may affect the readings obtained, and shall, therefore, be noted in the noise survey report.

**3.3.2** The meteorological conditions such as wind and rain, as well as sea state, shall be such that they do not influence the measurements. Wind force 4 and sea state 3 ( equivalent to wind speed of 11 to 16 knots ) shall not be exceeded. If this cannot be achieved, the actual conditions shall be reported.

**3.3.3** Care shall be taken to see that noise from extraneous sound sources, such as people, construction and repair work, does not influence the noise level onboard the ship at the positions of measurement. If necessary, readings may be corrected for steady state background noise according to the energy summation principle.

### 3.4 Safe Measurement Conditions

With the meter set to 'fast response' spot checks should be made at positions of high noise level to ensure the safety of a person taking measurements.

## 4 MEASUREMENT PROCEDURES

**4.1** During noise level measurement, only seafarers necessary for the operation of the ship and persons taking the measurement shall be present in the space concerned.

**4.2** Sound pressure level readings shall be taken in decibels using an A-weighting filter [ dB ( A ) ].

**4.3** The meter shall be set to 'slow' response and the readings made only to the nearest decibel. A measuring time of at least 5 seconds shall be allowed. If a meter fluctuates in level within a range of no more than 5 dB ( A ) maximum to minimum, an estimate of the level shall be made by averaging the excursions of the needle by eye.

**4.4** If the range fluctuations are in excess of 5 dB ( A ), or the sound is cyclic, irregular or intermittent in operation an integrating meter shall be used set to A-weighting. Integration shall be made over a period of at least 30 seconds.

### 4.5 Exposure Measurement

In addition to the steady state and fluctuating noise level measurements, the noise exposure of seafarers may be measured as allowed by **3.2** of IS 13161 ( Part 3 ) : 1992, if necessary.

### 4.6 Calibration

The sound level meter shall be calibrated before and after measurements are taken.

## 5 MEASUREMENT POSITIONS

### 5.1 Points of Measurement

If not otherwise stated, measurements, shall be performed with the microphone at a height of between 1·2 m and 1·6 m from the deck. The distance between two measurement points shall be at least 2 m, and in large spaces not containing machinery, measurements shall be taken at intervals not greater than 7 m throughout the space including positions of maximum noise level. In large cargo holds, not more than three measurements need be taken. In no case shall measurements be taken closer than 0·5 m from the boundaries of space. The microphone positions shall be as specified in **5.2** to **5.8**.

### 5.2 Accommodation Spaces

One measurement shall be made in the middle of the space. The microphone shall be moved slowly horizontally and/or vertically over a distance of 1 m and the mean reading recorded. Additional measurements shall be performed at other points if appreciable differences, that is greater than 10 dB ( A ), in the level of sound in side the room occur, especially near the head positions of a sitting or lying person.

### 5.1 Machinery Spaces

**5.3.1** Measurements shall be made at the principal working and control stations of the seafarers in the machinery spaces and in the adjacent control rooms, if any special attention being paid to telephone locations and to positions where voice communication and audible signals are important.

**5.3.2** Readings shall not normally be taken closer than 1 m from operating machinery, or from decks, bulkheads or other large surfaces, or from air inlets. Where this is not possible, measurement shall be taken at a position midway between the machinery and adjacent reflecting surface.

**5.3.3** Measurements from machinery which constitutes a sound source shall be taken at 1 m from the machinery. Measurement shall be made at a height of 1·2 m to 1·6 m above the deck, platform or walkway as follows:

a) At a distance of 1 m from, and at intervals not greater than 3 m around, all sources such as:
    1) Main turbines or engines at each level
    2) Main gearing
    3) Turbo-blowers
    4) Purifiers
    5) Electrical alternators and generators
    6) Boiler firing platform
    7) Forced and/or induced draught fans
    8) Compressors
    9) Cargo pumps ( including their driving motors or turbines )

( In order to avoid an unnecessarily large and impractical number of measurements and recordings in the case of large engines and of machinery spaces where the measured sound pressure level in dB ( A ) at the intervals above does not vary significantly, it will not be necessary to record each position of maximum sound pressure level shall, however,be made and recorded, subject to at least four measurements being recorded at each level ).

b) At local control stations, for example, the main manoeuvring or emergency manoeuvring stand on the main engine and the machinery control rooms;

c) At all other locations not specified in (a) and (b) which would normally be visited during routine inspecition, adjustment and maintenance;

d) At points on all normally used access routes, unless covered by positions already specified above, at intervals not greater than 10 m; and

e) In rooms within the machinery space, for example, workshops.

( In order to restrict the number of measurements and recordings, the number of recordings can be reduced as in (a), subject to a total of at least four measurements, including those specified in this paragraph, being recorded at each machinery space level up to upper deck.

### 5.4 Duty Stations

The noise level shall be measured at all points where the work is carried out. Additional measurements shall be performed in spaces containing duty stations if variations in noise level are thought to occur in the vicinity of the duty stations.

### 5.5 Normally Unoccupied Spaces

**5.5.1** In addition to the spaces referred to in **5.2** to **5.4**, measurements shall be made in all locations with unusually high noise levels where seafarers may be exposed, even for relatively short periods, and at intermittently used machinery locations, for example, cargo discharge pumps.

**5.5.2** In order to restrict the number of measurements and recordings, noise levels need not be measured for normally unoccupied spaces, holds, deck areas and other spaces which are remote from sources of noise and where a preliminary survey shows that the noise levels are well below the limit specified in IS 13161 ( Part 3 ) : 1992.

### 5.6 Open Deck

Meaurements shall be taken in any areas provided for the purpose of recreation and additionally where a preliminary survey indicates that the maximum exposure limit without protection may be exceeded.

### 5.7 Intake and Exhaust Openings

When measuring noise levels at the intake and exhaust of engines and near ventilation, air-conditioning and cooler systems, the microphone shall where possible, be placed outside the gas stream at a distance of 1 m from the edge of the intake or exhaust opening and at a 30° angle away from the direction of the gas stream and as far as possible from reflceting surfaces.

### 5.8 Navigating Bridge Wings

Measurements shall be taken on both navigating bridge wings but shall only be taken when the navigating bridge wing to be measured is on the lee side of the ship.

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BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75
Telegrams : Manaksanstha
( Common to all Offices )

| Regional Offices : | | Telephone |
|---|---|---|
| Central : | Manak Bhavan, 9 Bahadur Shah Zafar Marg<br>NEW DELHI 110002 | 311 01 31<br>331 13 75 |
| Eastern : | 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola<br>CALCUTTA 700054 | 37 86 62 |
| Northern : | SCO 445-446, Sector 35-C, CHANDIGARH 160036 | 53 38 43 |
| Southern : | C. I. T. Campus, IV Cross Road, MADRAS 600113 | 235 02 16 |
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